

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in view of the present amendment and in light of the following discussion, is respectfully requested.

Claims 1-3 and 5-10 are pending. In the present amendment, Claims 1-3 and 5-8 are currently amended and Claim 4 is canceled without prejudice or disclaimer. Support for the present amendment can be found in the original specification, for example, at page 16, line 16 to page 18, line 8, at page 18, line 34 to page 20, line 20, in Figures 14-17 and 19, and in Claim 4. Thus, it is respectfully submitted that no new matter is added.

In the outstanding Office Action, Claims 6 and 7 were objected to; and Claims 1-10 were rejected under 35 U.S.C. § 103(a) as unpatentable over either Suzuki (Japanese Publication No. 2001-115267) or Pennington (U.S. Patent No. 5,866,986), in view of Gondo (Japanese Publication No. 10-298787).

Initially, it is noted that the claims are amended based on the claim listing in the Translation of Amendments to the Claims under PCT Article 19 Amended Sheets filed with the original application.

In response to the objection to Claims 6 and 7 as being in improper multiple dependent form, it is noted that Claims 6 and 7 are hereby amended to no longer depend on another multiple dependent claim. Further, it is noted that Claim 4 is hereby canceled without prejudice or disclaimer. Accordingly, it is respectfully requested that the objection to Claims 6 and 7 be withdrawn.

In response to the rejections under 35 U.S.C. § 103(a), Applicant respectfully requests reconsideration of these rejections and traverses these rejections, as discussed below.

Amended Claim 1 recites:

A plasma processing device, comprising:

a chamber provided to maintain an atmosphere
depressurized to less than atmospheric pressure;

a transfer pipe connected to the chamber;

a gas introduction mechanism provided to introduce a gas into the transfer pipe;

a microwave supply source provided to introduce a microwave from outside to inside of the transfer pipe; and

a light shield configured to block light emitted from the plasma and to allow passage of active species emitted from the plasma, the light shield being provided substantially in contact with an inner wall of the chamber at a part where the active species are introduced into the chamber, wherein

the plasma processing device is provided to form a plasma of the gas in the transfer pipe and to perform ashing processing to remove a resist of a workpiece having a low-k material on which the resist is formed placed in the chamber,

the transfer pipe is connected to an opening in the inner wall of the chamber, the inner wall being generally perpendicular to a major surface of the workpiece, and

the workpiece is not provided in a direct line of sight from the plasma.

In the plasma processing device recited in Claim 1, a light shield is provided that is configured to block light emitted from the plasma and to allow passage of active species emitted from the plasma. Additionally, the light shield is provided so as to be substantially in contact with an inner wall of the chamber at a part of the chamber where the active species are introduced into the chamber. Thus, the light shield is placed apart from the workpiece, and therefore, the active species such as radicals can diffuse in the space inside the chamber before they reach the workpiece. As a result, active species can be supplied uniformly onto a surface of the workpiece while a light is efficiently blocked by the light shield. Thus, a uniform and efficient plasma treatment can be realized while suppressing the adverse effect of light emitted by the plasma. It is respectfully submitted that the cited references do not disclose or suggest every feature recited in amended Claim 1.

Pennington describes a plasma generator assembly 20 including a first plasma chamber 24 and a second plasma chamber 32 connected to the first plasma chamber 24.¹ Additionally, Pennington describes a vacuum chamber 42 which includes a perforated plate 36 and/or an optical baffle 38.²

However, it is respectfully submitted that Pennington does not disclose or suggest “a light shield configured to block light emitted from the plasma and to allow passage of active species emitted from the plasma, the light shield being provided substantially in contact with an inner wall of the chamber at a part where the active species are introduced into the chamber,” as recited in amended Claim 1.

Instead, as can be seen in Figures 1 and 2 of Pennington, both the perforated plate 36 and the optical baffle 38 are not placed substantially in contact with the inner wall of the chamber 42 but are instead placed near a center of the chamber 42. Thus, the perforated plate 36 and the optical baffle 38 are placed close to the items 22 to be treated such that active species such as radicals generated by the plasma are also blocked by the perforated plate 36 and the optical baffle 38. As a result, the radicals are not provided uniformly onto the surface of the items 22 to be treated, and uniform plasma treatment such as ashing is difficult to perform. Accordingly, it is respectfully submitted that the perforated plate 36 and the optical baffle 38 are not the claimed light shield.

Suzuki describes a microwave plasma processor including a base 102, a dielectric window 107 and a high conductance opaque member 109 provided between the base 102 and the dielectric window.³ The Office Action equates the high conductance opaque member 109 described in Suzuki to the claimed light shield.

However, it is respectfully submitted that Suzuki does not disclose or suggest “a light shield configured to block light emitted from the plasma and to allow passage of active

¹ See Pennington, at column 2, line 60 to column 3, line 12 and in Figures 1, 2, and 7.

² See Pennington, at column 3, lines 20-25 and in Figures 1 and 2.

³ See Suzuki, at paragraph [0031] and in Figure 1.

species emitted from the plasma, the light shield being provided substantially in contact with an inner wall of the chamber at a part where the active species are introduced into the chamber,” as recited in amended Claim 1.

Instead, similar to Pennington, the high conductance opaque member 109 described in Suzuki is not placed substantially in contact with the inner wall of the chamber but is placed near the center of the chamber. Thus, the high conductance opaque member 109 is placed close the workpiece on the base 102 such that active species such as radicals generated by plasma are blocked by the high conductance opaque member 109. As a result, the radicals are not provided uniformly onto a surface of the workpiece. Thus, uniform plasma treatment such as ashing is difficult to perform. Accordingly, it is respectfully submitted that the high conductance opaque member 109 is not the claimed light shield.

Accordingly, it is respectfully submitted that neither primary reference (Pennington and Suzuki) disclose or suggest the light shield recited in amended Claim 1. Further, it is respectfully submitted that the secondary reference (Gondo) does not cure the above noted deficiencies of Suzuki and Pennington with respect to the claimed light shield.

Accordingly, it is respectfully submitted that neither the combination of Suzuki and Gondo, nor the combination of Pennington and Gondo, disclose or suggest every feature recited in amended Claim 1. Thus, it is respectfully requested that the rejections of Claim 1, and all claims dependent thereon, be withdrawn.

Independent Claims 3, 5, and 8, while directed to alternative embodiments, recite features similar to those discussed above with respect to Claim 1. Thus, it is respectfully submitted that Claims 3, 5, and 8, patentably define over the cited references for at least the reasons discussed above with respect to Claim 1. Thus, it is respectfully requested that the rejections of Claims 3, 5, and 8, and all claims dependent thereon, be withdrawn.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)



Gregory J. Maier
Attorney of Record
Registration No. 25,599

Colin B. Harris
Registration No. 58,969